ECOR 1051

Project Report

Submitted by

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The Problem Statement

Photography is very prominent in today's society. Trends report that everyday 1.8 billion digital photos are uploaded [4]. Image manipulation and retouching are essential parts of photography. Photographers, businesses, marketers, and everyday people have the need to create eye-catching and appealing images.

Figure 1: *Example of the effects of image filters to improve the aesthetic of a photograph by changing the hue. Here the individual is utilizing the effects of a filter to improve the aesthetic of a photograph. For this example in particular, a simple filter was applied, changing the hue of the original image. This simple technique makes the individual and what they represent, look more professional, whether it be for a magazine cover or a business photo [2].*

A photo-editing program enables users to retouch photos, whether that means applying various filters, increasing or decreasing the brightness, manipulating the contrast of the image, etc. The basis of a photo-editing program lies in **digital colour representation** which is essentially the manipulation of pixels in an image.

A colored image is typically represented by a bit depth ranging from 8 to 24 or more [1]. Each bit is divided into three groupings: 8 red, 8 green and 8 blue. A combination of groupings enables the representation of different colours and tones [1].
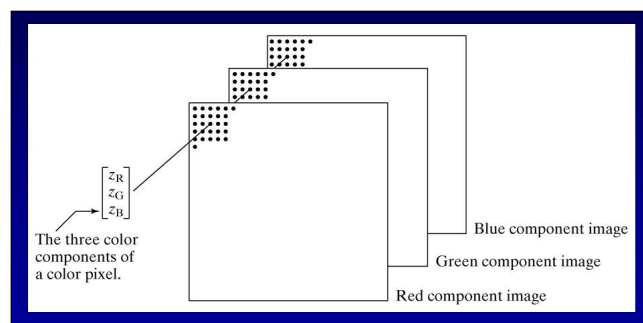

Figure 2: *Demonstrates the combination of red, green and blue bits [3].*

The Project Goal

The goal of this project is to design and create a simple, interactive photo-editing program. In a basic image editor, users will be able to upload an image to retouch through the application of a variety of image filters. Each filter will vary in hue, brightness and contrast, etc.

The Project Design

The program will be compiled from multiple *Modules*, which are functional components that allow information and data to be shared between them in Python. There are

a few pre-developed modules :CIMPL[5] which will be used as a lightweight interface to a more robust and capable imaging library PIL[6], with individual modules for specific filters and features being written through each Milestone. By structuring the project in this manner, discrepancies between modules can be minimized, and the visual efficiency of the final program can be largely improved, leading to better design flow and organization. At runtime, there are three functional steps for when the program is run.

1)   Libraries are loaded, and the program is prepared to be run. Any necessary libraries are loaded at run time, and a user interface will prompt the user for the filepath as well as a set of functional manipulations.

2)   The data from the image will be processed, and the functional manipulations will be applied. A prompt will appear asking the user for any further manipulation. This is repeated as often as necessary, until the user decides to exit the code.

3)   The image is passed through a final stage where it is prepared to be exported. Finally, the new image is returned back to the user.

The Project Process

This project is divided into three different Milestones, where one milestone is expected to be completed over the course of three lab periods. The project process will consist of regular meetings during the week, in addition to the morning labs which are scheduled on Mondays and Wednesdays during the week. These frequent meet up times will ensure that the milestones are completed before the due date. Every group member understands the importance of their attendance to these group meetings as this is a *group* project where the work is designed to be divided equally. As a team, Milestones will be

developed incrementally, before being tested and implemented. Team members will each have assigned tasks to complete before the end of the Milestone. Testing will involve the manipulation of sample photos.

Team Contributions

Anthony Luo: Wrote combined code, Project Design.

Alia Nichol: Wrote code for the green filter. Wrote the Project Goal and the Project Statement.

Emilio Lindia: Wrote code for the blue filter. Wrote the Project Process and the Project Statement.

Abdelrahman Alatoom: Wrote code for the red filter (Assisted by Anthony Luo). Wrote Team Contributions.

References

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[3] Slide Player. (2019). *Digital Image Processing* [Online]. Available https://slideplayer.com/slide/8752313/

[4] The Atlantic. (2015). *How Many Photographs of You Are Out There In the World?* [Online]. Available https://www.theatlantic.com/technology/archive/2015/11/how-many-photographs-of-you-are-out-there-in-the-world/413389/

[5] D.L. Bailey 06-Oct-2017.

[6] A. Clark, "Pillow". *Pillow* 21-Oct-2019